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Trip Reduction Zoning

with a Sample Application for the City of Cambridge

Metropolitan Area
Planning Council
110 Tremont Street
Boston, MA 02108

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Trip Reduction Zoning

With A Sample Application

For The

City of Cambridge

Prepared By

The Metropolitan Area Planning Council

September 23, 1988

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PREFACE

At the request of the City of Cambridge, the Metropolitan Area Planning Council has studied trip reduction zoning to determine the potential for zoning to reduce future traffic growth.

The study relies heavily on the experiences of California, Washington and other states as background on the potential for trip reduction zoning.

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EXECUTIVE SUMMARY

Traffic congestion and resulting air quality problems have been recurring issues in metropolitan Boston for many years. Until recently the solution to these problems has been to build wider and more complex highways.

As this solution has become more expensive and, in many cases, not feasible, public agencies have concluded that wider highways are not the most effective means of addressing congestion and air quality problems. The tide has now turned to expanding the role of demand management as a solution to these issues.

This report explores the role of local land use controls in reducing traffic growth rates. The report summarizes trip reduction regulations in California and Virginia, explores relevant legal issues pertaining to the use of trip reduction regulations and provides a model local ordinance. An example of the application of a trip reduction ordinance is supplied in the form of a case study for the City of Cambridge.

MAPC recognizes that other zoning strategies such as mixed use developments may also provide for a reduction in total travel through shared trip purposes. We encourage this form of zoning along with the use of the recommendations in this study to accomplish a multi-faceted trip reduction effort.

For additional information on trip reduction zoning, or programs that are available to communities and local developers to achieve a communities goals, contact Daniel Fortier at the MAPC at (617) 451-2770 or CARAVAN for Commuters at (617) 973-7189.

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I. INTRODUCTION

Traffic in the metropolitan Boston area has increased by more than three percent per year over the last five years. This growth has led to longer and more severe periods of traffic congestion.

Increasing traffic and congestion are direct results of the region's renewed economic vitality. Traffic and congestion are accompanied not only by aggravation, but real economic costs and decreased standards for safety and air quality. Over the past ten years, it has been quite common to address these unwanted offshoots of economic vitality by expanding roadway capacity, but in many cases this has not been possible.

Trip and travel reduction are becoming increasingly important to planners in metropolitan Boston. As major road networks and support systems are stretched to their limits, the most feasible solution is to reduce total travel by commuters.

Nationwide, more and more communities are initiating mandatory traffic management programs for existing and future developments. Closer to home, many projects that are undergoing Massachusetts Environmental Protection Agency (MEPA) review are being required to promote ridesharing and/or subsidize Massachusetts Bay Transportation Authority (MBTA) transit passes. These actions by MEPA are attempts to reduce the rate of traffic growth.

In recent years many communities in the growing areas of the west and southwest sections of the country require traffic management measures as a part of project approval. These ordinances often require a project to achieve specific transit use and vehicle occupancy standards. If these standards are not achieved, financial penalties are imposed.

In Massachusetts, traffic management requirements as a part of project approval have been implemented on an ad-hoc basis. The Massachusetts Environmental Protection Act (MEPA) allows the Executive Office of Environmental Affairs (EOEA) to review large development proposals for traffic impacts. Frequently, EOEA will persuade a developer to promote ridesharing opportunities as a part of the MEPA certification process.

The City of Cambridge has requested the Metropolitan Area Planning Council's assistance to develop an ordinance that will establish standards to reduce vehicle trips to proposed developments. Potentially this study will be a model for other communities in the region that are ready to establish similar trip reduction ordinances.

This report begins with a Literature Review (Chapter II) to explore the state of the art in trip reduction zoning ordinances, is followed by a discussion the Legal Issues for Trip Reduction Zoning (Chapter III) which explores the concept of regulating traffic growth with respect to the issue of taking without just compensation, and then a description of the Components of a Model Trip Reduction Zoning Ordinance (Chapter IV). These sections are followed by a case study for the City of Cambridge.

II. LITERATURE REVIEW

The Metropolitan Area Planning Council initiated this project by conducting a review of available literature on the subject of Trip Reduction Ordinances. The review identified two types of regulations in use - one aimed at reducing future impacts through zoning controls, and one aimed at all properties through local police powers.

The following is the result of the literature review.

A. Alexandria, Virginia
Ordinance 3204, Article R
Transportation Management Special Use Permit

This is a community-wide ordinance that attempts to reduce the number of single-occupancy vehicles through a transportation management special use permit. This ordinance applies to any individual building or structure which contains:

a. 50,000 or more usable square feet of commercial and/or professional office space;

b. 40,000 or more usable square feet of retail sales space;

c. 150,000 or more usable square feet of industrial space; or

d. 250 or more residential units.

Application for a special use permit is through the director of planning and community development. The application must include the names and addresses of the applicant and each person or entity owning interest in the application (along with the extent of ownership). The application must also include a traffic study detailing projected traffic volumes, resulting traffic conditions and a transportation management plan.

The application is reviewed by the director and recommendations are passed on to the city council for approval. In particular, the council looks at the transportation management plan to assure that:

a. 10% to 30% of the total number of trips in both the A.M. and P.M. peak hours utilize a mode of travel other than single occupancy vehicle; and

b. no more than 40% of the total daily single vehicle occupancy trips occur in each of the peak hours.

Once a permit is in effect, changes in the building or development may require a new application or an amendment if:

a. an enlargement, extension or increase constitutes more than 5% of the floor area (expressed in usable square feet).

b. in a mixed use development, any modification of use increases or decreases the proportion of floor area allocated to the dominant use by more than 20%.

c. any change in land use of a building or structure.

The special use permit becomes null and void concurrently with the expiration of the site plan. In the event that no site plan is required, the special use permit becomes null and void eighteen months after the date a permit is issued, unless operation or construction of the use has commenced.

The program is administered by the director of planning and community development in consultation with the directors of transportation, environmental services, transit services, and other departments as necessary.

B. City of Concord, California
Transportation Systems Management Program
Article VII, Chapter 2 (6)

The article mandates the formulation of both a transportation systems management fund and a transportation systems management plan.

The transportation systems fund was created to support efforts by the City of Concord to reduce the use of single-occupant vehicles during peak hours. The fund can be used for both capital and operating costs.

The money for this fund comes from three sources:

a. interest accrued in an in-lieu of parking fund created to offset voluntary parking reductions by developers and ensure funds to provide parking if it becomes necessary;

b. net income derived from city-operated facilities (including lots and garages) and parking meters; and

c. revenue derived from any contractual services the City may provide to projects for coordination of individual project Transportation Systems Management (TSM) programs.

This ordinance requires a TSM plan for both new and existing projects that are over a certain size threshold. For offices, the threshold for a TSM plan is 25,000 sq. ft., industrial 50,000 sq. ft., and commercial 100,000 sq ft. Residential projects over 100 units are required to submit a residential TSM plan. These plans would discuss the opportunities and means for the project to assist in "the achievement of city TSM goals and objectives." Such a plan serves as a base in determining appropriate conditions, if any, which may be imposed by the city.

For new projects, a preliminary TSM plan is submitted with an application for project approval. After approval of the project by the city, and prior to occupancy, the project sponsor enters into an agreement with the city which obligates future owners of the project to carry out the TSM plan. This obligation is recorded with the Contra Costa County Recorder. Whenever 60 percent of the leasable area of a project is occupied, or one year after initial occupancy, whichever comes first, the project sponsor shall conduct the first annual survey of tenant employees using the survey provided by the city. The city's commute planning manager monitors the project and evaluates the survey one month after the annual employee survey.

C. City of Pleasanton, California
Transportation Systems Management
Ordinance No. 1154

In 1984 the City of Pleasanton, CA, adopted a transportation systems management ordinance designed to reduce peak hour traffic by 45%. The ordinance was adopted to meet carbon monoxide concentration standards on local streets and to meet minimum standards for traffic levels of service.

The goals of the Pleasanton ordinance are:

a. To maintain peak hour Levels of Service (LOS) on city streets and intersections at no worse than LOS C for as many years into the future as feasible and to exceed mid-LOS D only after TSM measures have achieved a forty-five percent (45%) reduction in peak period employee commute trips.[1]

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[1]Level of service is a method of grading roadway performance. Level of service categories range from "A" or free flow conditions to "F" or forced flow conditions.

b. To prevent traffic on city streets and intersections from reaching LOS E during the peak hour.

c. To reduce peak hour traffic volumes generated by permanent employees working within the City by a minimum of 45 percent through use of developed TSM programs by employers and commercial/industrial complexes.[2]

The city requires the following of employers to accomplish these goals:

a. All employers are required to establish commute pattern data and to provide carpool and vanpool matching information. This includes the number of employees, city and zip code of each employee residence, commute modes of each employee, maximum number of employees on each shift, and typical arrival and departure times for each employee.

b. Employers of 10 or more employees on a single shift not located in complexes are required to design and implement a TSM information program which disseminates ridesharing and transit information to all employees.

c. Employers with 50 or more employees on a single shift and all employers located in complexes are required to design and implement a TSM program to achieve reductions in peak period traffic. These employers are required to appoint a workplace coordinator responsible for implementing transit use, ridesharing, non-vehicular commute modes and alternative work hour programs designed to accomplish a 45% reduction in vehicle trips in the peak period.

d. Central business district merchants are required, through the Downtown Merchants Association, to appoint a Downtown Coordinator to work with the city to reduce peak period traffic.

Reduction goals in the Pleasanton ordinance call for a 15% reduction in the first year, a 25% reduction in the second year, a 35% reduction in the third year and 45% in the fourth year. The ordinance provides for fines on individual employers for non-compliance with the goals.

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[2]Ordinance No. 1154 at pages 2 & 3

D. Los Angeles
"Law Requiring Ride Sharing Combats Smog in Los Angeles"
William Fulton, City and State, (1/18/88)

In late 1987 Los Angeles, California was "hopelessly short of meeting federal air standards." This led to an ordinance that seeks to reduce peak hour travel by 25%. The ordinance is aimed at employers of 100 or more, which employ 40% of the Los Angeles area work forces. The ordinance mandates ride-sharing programs for 8,000 companies employing 1.5 million people.

E. City of Sacramento, California
Ref: Traffic Mitigation Reference Guide
U.S. DOT, December 1984.

The City of Sacramento adopted a Trip Reduction Ordinance in April 1983. The ordinance targets new nonresidential development and expansions of existing properties which will accommodate 200 or more workers. The ordinance is a tool to implement the 1982 Air Quality Plan. The ordinance calls for a 15% reduction in single occupant vehicle trips per development. This reduction is placed on top of an assumed existing ridesharing or transit use of 15%.

F. Findings from the Literature Review

The Literature review provided the following guidance for establishing Trip Reduction Zoning Ordinances:

1. A properly founded Trip Reduction Ordinance includes a specified set of problems which can be addressed through a trip reduction ordinance;

2. The process begins with the identification of a clear and pressing traffic problem;

3. A community needs to determine the land uses to be affected by the ordinance;

4. The ordinance should be based on an assessment of existing levels of traffic, ridesharing and transit use in the city;

5. Goals are usually set in terms of a change in level of service, absolute level of service or transit use;

6. Funds to support a trip reduction program usually are allocated from municipal sources for oversight of programs and private sources for implementation of programs;

7. Programs are administered by the developer or subsequent property owners;

8. A community needs to determine the type of trip reduction methods that are sought and the time frame in which the reduction in travel is desired;

9. The community needs to identify what information is necessary to develop a development project oriented TSM plan and to monitor compliance with the plan;

10. The community needs to grant approval power to a specific entity--generally a planning board or city council; and

11. Fines are usually levied that are severe enough to ensure compliance with the development project oriented TSM plan and the local trip reduction zoning ordinance.

III. LEGAL ISSUES RELATED TO RESTRICTING PROPERTY RIGHTS

Trip Reduction Zoning regulations have the effect of restricting private property rights based on the need to address transportation deficiencies located beyond the property boundaries. Given three United States Supreme Court Decisions in 1987 that dealt with private property rights and the regulation of such, the application of a trip reduction zoning regulation is reviewed here in light of these decisions and also relevant Massachusetts land use concerns.

A. Federal

The year 1987 was a watershed with respect to federal review of state and local land use regulations. After bypassing several opportunities in 1985 and 1986 to rule on the regulation of the use of property, in 1987 the United States Supreme Court issued three rulings on the effects of state and local land use regulations as land takings. Two of these court decisions were greeted with much fanfare, First Evangelical Lutheran Church v. City of Los Angeles, 55 USLW 4781 (1987) and Nollan v. California Coastal Commission, 107 S. CT 3141 (1987), as they attempted to define specifically when a local regulation of property constituted a taking. A third case received little notice, Keystone Coal Association v. De Benedictus, 480 U.S. - (1987), defined when a taking had not occurred. Together, these three cases along with the cornerstone takings court case Pennsylvania Coal Co. v. Mahon 260 US 393 (1922) provide a framework for developing a transportation management zoning ordinance.

Chief Justice Holmes ruled in 1922 that when the regulation of property goes too far, it will be considered a taking. However, he qualified this statement by stating that the question of taking depends upon the unique facts present in a particular situation. Justice Holmes argued that public desire to improve a public condition may regulate but not over-regulate a property.[3]

The three 1987 Supreme Court decisions agreed with the Pennsylvania Coal Co decision, however the lengthy minority reports in each decision illustrate the fine line between necessary public regulation and over-regulation of property.

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[3] Pennsylvania Coal Co. v. Mahon, 260 US 393 (1922)

In Keystone Coal Association v. DeBenedictus a state regulation restricting the removal of coal located under various public or residential structures, burial grounds or water bodies was challenged as a taking. The regulation allowed only 50% of the available coal to be removed from under these areas to ensure support of the land over the coal. The justification for the regulation was to reduce injury, to protect public health, safety and welfare caused by subsidence or settling of land in areas where coal has been mined. In this case the court viewed property rights as a bundle and stated that the destruction of one straw in the bundle is not a taking because the bundle of rights must be viewed in its entirety (see also Andrus v. Allard, 444 US 51, 1979).

The second 1987 ruling by the Supreme Court, First Evangelical Lutheran Church v. City of Los Angeles, did not define a taking. Rather this decision, dealing with a restrictive floodplain zoning regulation, stated that if the application of the regulation restricted all economic use of the land a taking would have occurred and financial renumeration would be necessary. The Supreme Court did not address whether the zoning ordinance was a taking as the lower courts had never decided this issue.

The last land use case of 1987 was that of Nollan v. California Coastal Commission. This case addressed a state regulation requiring specific coastal properties seeking building permits to dedicate beach frontage for public access. Since the California statute resulted in actual public occupation of private property, the court ruled that a taking had occurred.

What these cases indicate for transportation management zoning is that a community may regulate vehicular traffic to a development site without effecting a taking as long as the regulation does not go so far as to make the use of the property economically infeasible and the regulation is needed to protect the public's health, safety and welfare.

B. State Issues

State issues related to restricting property rights are quite similar to the federal issues. Put simply, any land regulation which goes so far as to make the use of the property economically infeasible is over-regulation. However, if a community follows a few simple rules of thumb, this situation can be avoided. In general the regulation should include:

a) Identification of a pressing, compelling problem;

b) Establishment of a clear strategy to solve the problem that bears a relationship to the need for the regulation; and

c) The trip reduction ordinance needs to allow for some use of the property that is economically viable that is not restricted by a special permit procedure.

An ordinance properly adopted under the auspices of Chapter 40A Section 9 Special Permit Procedure may best meet these criteria. Chapter 40A Section 9 reads:

> "Zoning ordinances or by-laws may also provide by special permits authorizing increases in the permissible density of population or intensity of a particular use in a proposed development; provided that the petitioner or applicant shall as a condition of the grant of said permit, provide certain open space, housing for persons of low or moderate income, traffic or pedestrian improvements, installation of solar energy systems, protection for solar access, or other amenities. Such zoning ordinance or by-laws shall state the specific improvements or amenities or locations of proposed uses for which the special permits shall be granted, and the maximum increases in density of populations or intensity of use which may be authorized by such permits."

Such an ordinance would provide for a minimal, but economically viable, use of property, and an increased intensity in the use of the property up to a predetermined maximum density in exchange for traffic amenities - increased vehicle occupancy, increased transit use, etc.

IV. COMPONENTS OF MODEL TRIP REDUCTION ZONING ORDINANCE

Based upon the findings of the literature review and the legal issues previously discussed, one can begin to put together an ordinance to accomplish a community's trip reduction goals. It is clear that the ordinance should cite the statutory authorization for the ordinance, the intent of the ordinance, applicability of the ordinance, allowed by right minimum density, the strategies to be employed, and maximum density provisions.

A. Key Provisions

1. A Statement on Authority

The ordinance should cite the statute from which the community is drawing its authority. This authorizing statute will provide guidance to the community in determining what are the powers granted to communities under the ordinance and to the courts, if the ordinance is challenged. In Massachusetts this authority would originate in Chapter 40A, Section 9 which allows communities to grant density increases up to a predetermined maximum density in exchange for transportation amenities.

2. A Statement of Intent

The statement of intent cites the reasons for adopting the trip reduction ordinance, and the local goals and objectives i.e. to provide for the health, safety and welfare of the citizens of a community by lessening congestion and reducing air quality impacts caused by new development.

This section of the ordinance may include identification of the specific transportation problems that have created the need for the ordinance. For instance, listing intersections with capacity of safety deficiencies could be made in this part of the ordinance.

3. Applicability of the Ordinance

Chapter 40A, Section 9 governs density increases above a minimum allowed by right density. Special permits for density increases under this law cannot restrict all use of the land. Thus it is important that the ordinance identify what land uses and densities are governed by the trip reduction ordinance. This section will also detail the areas where the trip reduction ordinance is in effect, and the trip reduction goals in each area, either in total vehicle trips, percent single occupant vehicles, percent transit use or automobile occupancy rates.

4. Strategies

The ordinance should identify the strategies to be employed to achieve the trip reduction goals for the community. This should include an identification of transportation systems management requirements such as the preparation of an access plan, employee/visitor surveying of travel modes, naming of a TSM coordinator, transit pass initiatives, carpool or vanpool programs to be employed and ongoing monitoring of compliance with the goals.

5. Maximum Density

Chapter 40A, Section 9 provides for density increses up to a maximum allowable density. This section should identify the maximum density provisions that are allowed in the trip reduction target areas. If the community is going to allow any other incentive programs to encourage trip reduction programs they could also be located in this section.

B. Model Ordinance

Section I Authority

A. This ordinance shall be known and may be cited as the "(Town/City/Name) Trip Reduction Ordinance."

B. The community has authority to adopt this ordinance through its special permit regulations pursuant to Chapter 40A, Section 9, Massachusetts General Law.

Section II Intent and Purpose

A. Planning for future traffic needs of the Town/City of _____ to insure the health, safety, welfare and economic well being of the citizens of (Town/City Name) is the mandated responsibility of the community pursuant to Chapter 40A, Massachusetts General Laws.

B. This ordinance is intended to reduce future traffic congestion and air quality impacts caused by development activity that place significant demand on the community's road network.

C. This ordinance is intended to achieve a 35% reduction in future traffic growth and air pollution emmissions by requiring future development to achieve trip reduction standards identified in Section III.B below

D. [Listing of traffic deficiencies.]

Section III <u>Applicability</u>

A. Any person who proposes any nonresidential development in excess of 10,000 square feet, employing more than 25 persons, or generating more than 50 peak hour trips shall be obligated to meet the trip reduction goals of the Town/City of _____ as described in Section III.B below.

B. Trip Reduction Goals

Land Use Type	ITE Land Use Code[1]	Estimated Peak Hour Trip Rate	Trip Reduction Goal	Allowed Vehicle Trips
Commercial Retail <100,000 S.F.	821	3.12/000 SF[2]	-35%[3]	2.03/000 SF[2]
Commercial Retail 100,000-200,000 S.F.	822	4.13.000 SF[2]	-35%	2.68/000 SF[2]
Commercial Retail >200,000 S.F.	823	2.83/000 SF[2]	-35%	1.84/000 SF[2]
High Turnover Sit Down Restaurant	832	5.78/000 SF[2]	-35%	3.76/000 SF[2]
Quality Sit Down Restaurant	831	3.07/000 SF[2]	-35%	2.0/000 SF[2]
Bank w/Drive Through Window	911	14.36/000 SF[2]	-35%	9.33/000 SF[2]
Warehouse	150	1.63/000	-35%	1.06/000 SF
Office <100,000 SF	711	2.20/000 SF	-35%	1.83/000 SF
Office 100,000-200,000 SF	712	2.03/000 SF	-35%	1.32/000 SF
Office >200,000 SF	713	2.04/000 SF	-35%	1.33/000 SF
Manufacturing	140	0.75/000 SF	-35%	0.49/000 SF
Hotel/Motel	310	0.73/room	-35%	0.47/room
Supermarket	850	6.35/000 SF[2]	-35%	4.13/000 SF[2]

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1. Institute of Transportation Engineers, Trip Generation Manual 3rd edition, 1985

2. New Trips - after reduction in trip rate for linked trips between two or more commercial sites as established by the I.T.E. report Transportation and Land Development.

3. Massachusetts State Implementation Plan for Ozone and Carbon Monoxide emmission reduction goal.

For mixed use development the allowed trip rate shall be equal to 65% of the total ITE estimated trip rate.

Section IV Strategies

A. All proposed nonresidential development activity over 10,000 square feet, employing more than 25 persons or generating more than 50 peak hour trips shall submit a transportation access plan that clearly identifies a combination of TSM strategies designed to meet the ordinance goals described in Section III B. These strategies should include, but not be limited to:

1) Vanpool/Carpool incentive programs, such as: employer subsidies for vanpools/carpools, preferred vanpool/carpool parking, ride matching services, and providing parking at the vanpool/carpool pick-up site.

2) Providing shuttle service to transit stations.

3) Allowing and encouraging flexible work hours and flexible work weeks.

4) Encouraging non-vehicle commute modes by providing on-site bicycle storage, locker room facilities, etc.

5) Site designs which are conducive to shuttle/transit/vanpoool use i.e. convenient, weather protected drop-off and pick-up areas.

6) Participation in a transit pass program, where appropriate.

7) Provision of on-site services, retail opportunities, and housing if allowed in the zone.

B. Every proposed nonresidential development activity over 10,000 square feet, employing more than 25 persons, or generating more than 50 peak hour trips shall commit to the naming of a full or part time TSM coordinator for the proposed project at the time of project approval or, if employing less than 100 people, commit to participating in a transportation management organization if available. Said TSM coordinator shall be responsible for:

1. Implementing the strategies identified in the transportation access plan to meet the community goals;

2. Reviewing project compliance with the strategies in the access plan and community goals and, if necessary modifying these strategies to increase the effectiveness of the program, with town/city approval to accomplish the goals;

3. Undertaking annual surveys of employees and visitors to the site to determine the applicability of TSM requirements and to monitor employee commute patterns. The TSM coordinator shall provide this annual report to the city/town in a timely fashion after the start of each calendar year; and

4. Non-compliance with the TSM requirements of the project shall be considered a zoning violation and will be subject to fines of $100 per day as authorized in Chapter 40B of the General Laws.

Section V Maximum Density

The maximum density in each zone shall remain as it was prior to the adoption of this ordinance.

C. Variations To Model Ordinance

As with all model ordinances, the above ordinance will need to be adapted to meet the needs of a particular community. Communities with a sizable professional staff may also want to consider using a graduated trip reduction measure. Such a measure could state that increases in density would be based upon increasing requirements for trip reduction - for instance a doubling of allowed floor space may require measures to reduce unmitigated traffic by 50% and a tripling of allowed floor space would require measures to reduce traffic by two-thirds.

V. TRAFFIC CONDITIONS IN THE CITY OF CAMBRIDGE

As discussed in Chapter II and III, the City of Cambridge needs to establish that a clear and pressing problem exists which can best be addressed by adoption of a Transportation Management Zoning Ordinance. To establish need, this report relies on data gathered from the Massachusetts 1982 State Implementation Plan for Ozone and Carbon Monoxide (SIP), and environmental impact reports filed for the following development projects in Cambridge:

1. Alewife Center Draft Environmental Impact Report, Monacelli Associates, Inc. December 1986;

2. University Park Draft Environmental Impact Report, March 1986;

3. Cambridge Park Phase 2, Vanasse Hangen Associates, July 1986;

4. Lechmere Canal Final Environmental Impact Report;

5. The Galleria at Riverside Place Supplemental Final Environmental Impact Report, Vanasse, Hangen, Brustlin Inc., September 1987; and

6. CWT/Brattle Square Project, LEA Group Inc., November 1987.

These sources provide information concerning air quality, traffic growth, capacity problems on the road network and the estimated mode choice for commuters to Cambridge.

A. Air Quality

In 1982 the Massachusetts Department of Environmental Quality Engineering, Division of Air Quality Control prepared the Massachusetts 1982 State Implementation Plan for Ozone and Carbon Monoxide (SIP). This plan identifies air pollution problem areas statewide, and proposes a series of steps that would alleviate these problems. The 1982 SIP focused on ozone and carbon monoxide problem areas.

One of the problems identified in the SIP was that of non-methane organic compounds (NMOC). NMOC's from auto emissions are a major portion of the pollution problem.

Air pollution is a contributing factor to heart and lung disease and cancer. The 1982 SIP identified a need to reduce non-methane organic compounds (NMOC) in Metropolitan Boston by 35% to meet areawide emission standards. The SIP identified a number of transit and highway improvements which would cumulatively reduce congestion and emissions. These included intersection improvements, expansion of the Red, Orange and Green lines of the MBTA and increased commuter parking in fringe locations. When the December 31, 1987 compliance date passed, Metropolitan Boston had not met its reduction goals.

B. Traffic Growth

Recent development activity in Cambridge and Boston has resulted in significant increases in traffic on Cambridge streets. Since 1979 more than 3 million square feet of office space has been added in Cambridge. This, in turn has led to a rapid rise in traffic on major thoroughfares and local streets. Regional traffic growth has averaged 3.9% per year in recent years.

C. Problem Locations

A MAPC review of the environmental impact reports (EIR's) listed above found a number of existing and anticipated traffic problem locations.

At present eight intersections listed in the EIR's operate at level of service F, roadway failure; seven operate a level of service E, highly unstable flow approaching capacity; and five operate at level of service D, unstable, forced flow (Map 1). These same EIR's identify significant increases in future roadway congestion. In the coming years (i.e. 1991) Cambridge can anticipate at least twenty-one intersections operating at level of service F; eight at level of service E; and six at level of service D (Map 2).

D. Estimated Mode Choice

In order to document the mode choice[4] of people employed in the City of Cambridge, MAPC reviewed assumptions used in recent years as part of Environmental Impact Reports submitted in compliance with the MEPA process. These mode-choice estimates are in most cases, targets for 1990, the anticipated year for the projects occupancy in the City.

Table 1 provides the assumed mode choice for four projects in the City. These estimates revealed a range of 50%-91% auto choice for various land uses. On average the assumptions call for approximately a 65% auto choice for office workers and a 25% auto choice for retail workers. The ranges illustrated in Table 1 may reflect differences in transit accessibility, especially with Alewife Center being located at the end of the Red Line and the Galleria being located near both Lechmere and Kendall Stations. The ranges will also be biased towards the type of new development occurring in the City of Cambridge.

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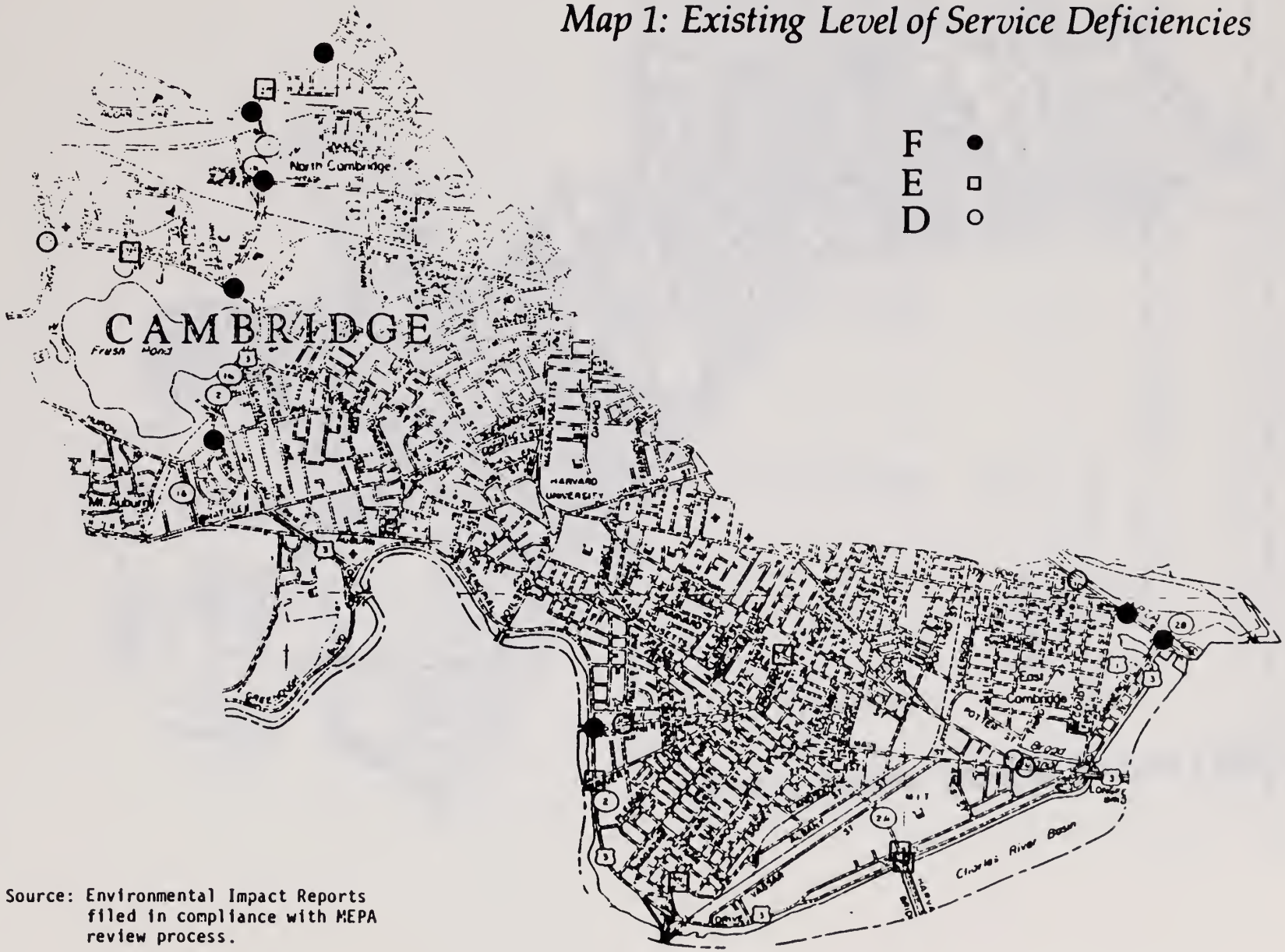
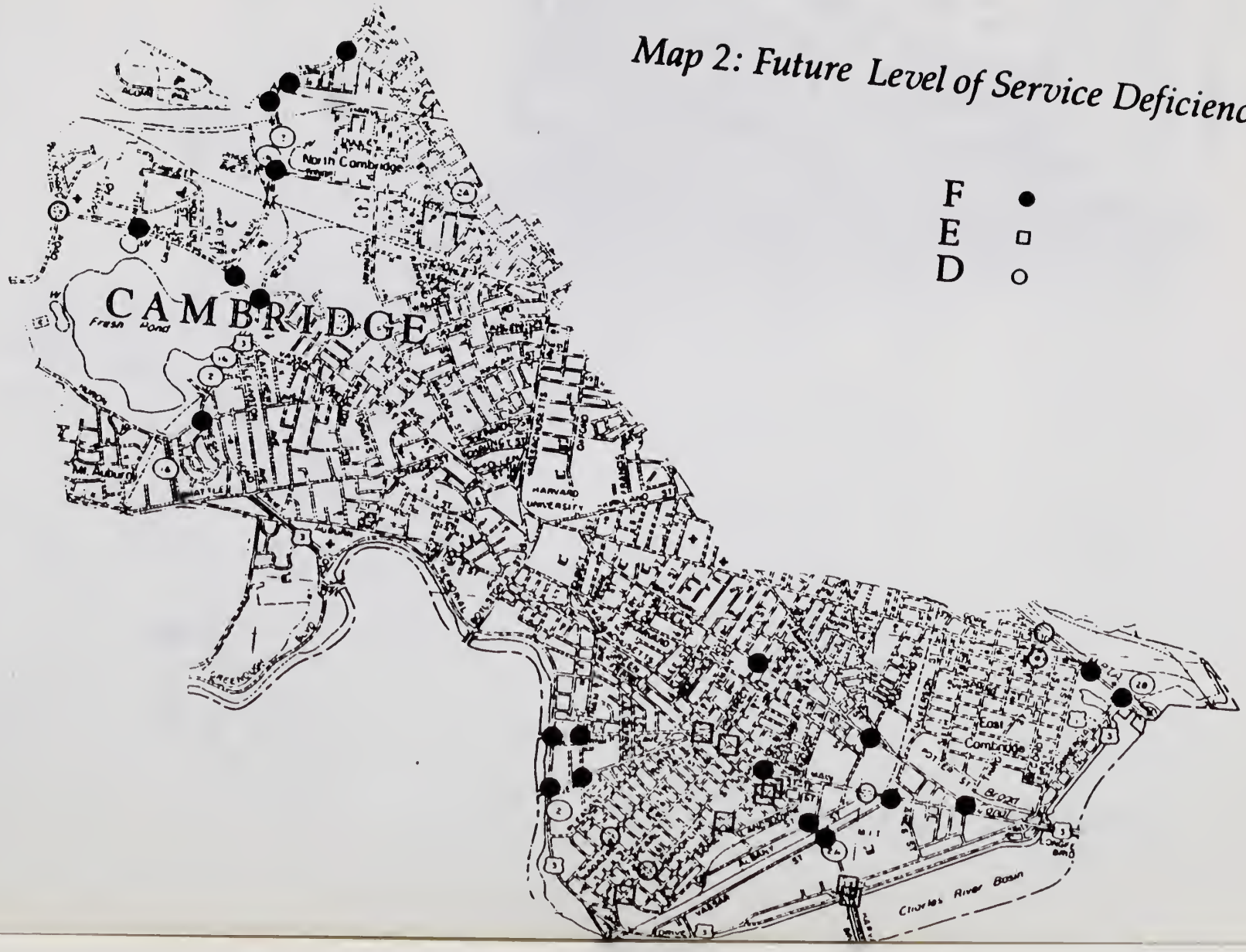
[4]Mode choice refers to a persons choice of how they travel to work, ie., single occupant vehicle, carpool, vanpool, transit, walking or bicycling.

Map 1: Existing Level of Service Deficiencies



Source: Environmental Impact Reports filed in compliance with MEPA review process.

Map 2: Future Level of Service Deficiencies



The City of Cambridge is in the process of surveying employers in the city to more accurately and objectively estimate present mode choice characteristics. This data should supplement the data in Table 1.

Table 1
Estimated Mode Choices in Cambridge

		Auto	Transit	Walk
Alewife Center				
Office		66%	34%	
Hotel		90.9	9.1	
University Park				
Office	Work	65	30	5
	Non-Work	65	20	15
Retail	Work	25	70	5
	Non-Work	35	15	50
Hotel	Work	25	70	5
	Non-Work	60	15	25
Cambridge Park		70	30	
Galleria		50	25	25

Source: MEPA Environmental Impact Reports required in recent years for projects in Cambridge

VI. GOALS OF THE CITY OF CAMBRIDGE FOR TRAFFIC MANAGEMENT

The City of Cambridge is concerned with increased traffic and congestion on city streets that has resulted from the economic boom of recent years. In an attempt to avoid "drowning in its own prosperity" city officials are interested in developing an incentive zoning program which will exchange development density privileges for meeting specific automobile reductions.

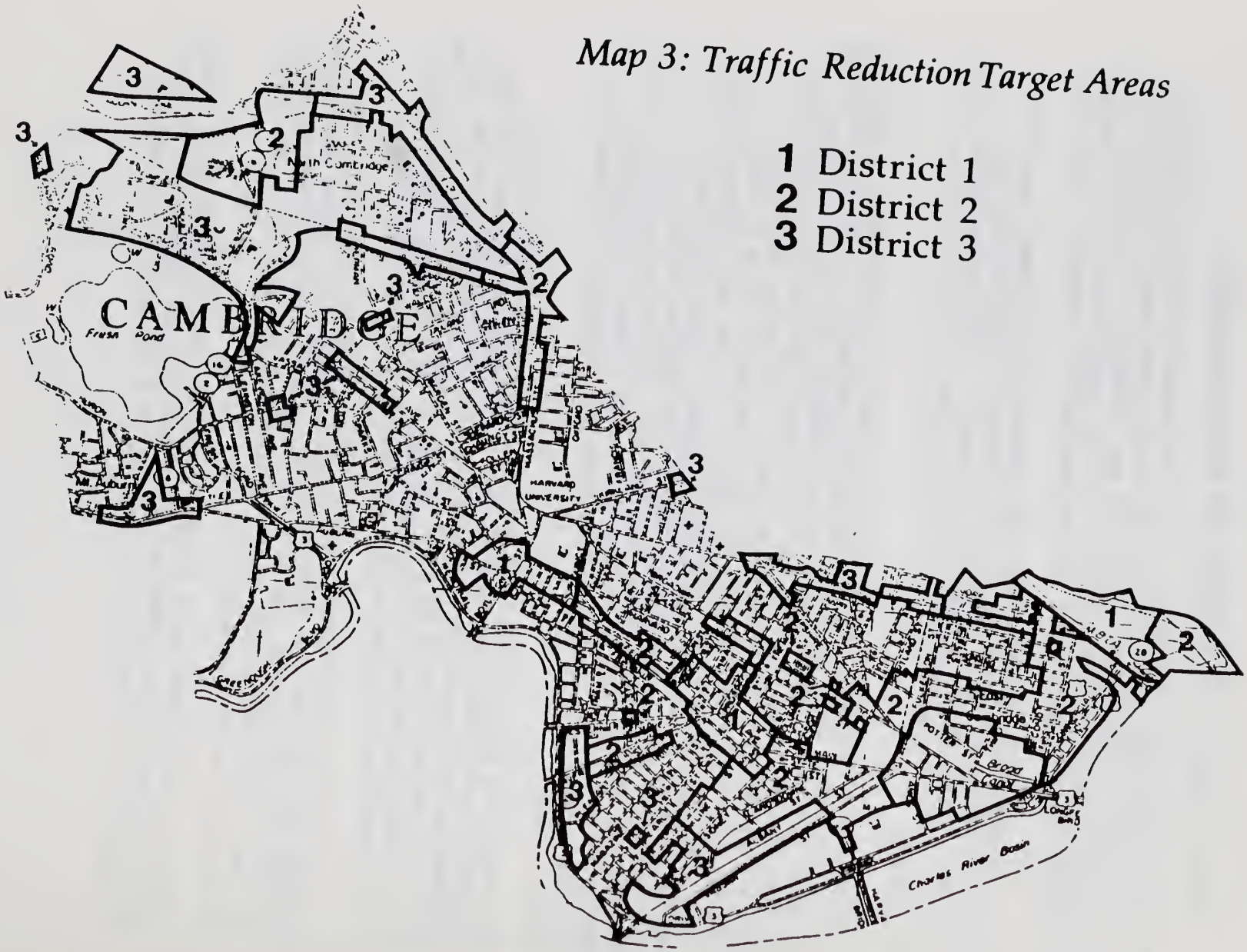
MAPC in cooperation with the Cambridge Community Development Department developed three overlay areas where trip reduction actions may be targeted. These areas are identified on Map 3. They were developed after review of city zoning patterns and the location of transit stations and bus routes.

In discussions with the City of Cambridge Community Development Department it was determined that the areas immediately adjacent to Red Line stations at Kendall, Central Square, Harvard and Lechmere Station on the Green Line had the greatest potential for transit use and thus could be established with a similar set of trip reduction goals. The areas immediately adjacent to Alewife Station and the area considered to be in relatively close proximity to Kendall, Central Square, Harvard and Lechmere transit stations, but not located immediately adjacent, would constitute a second trip reduction area with criteria that recognize the locational differences between these areas and the land adjacent to Harvard, Central Square and Kendall locations. The third area to have a set of trip reduction goals are non-residential areas not immediately adjacent to a subway station.

The overriding goal of the city and the region is to reduce traffic congestion and areawide air pollution. This proposal achieves this goal by reducing the rate of traffic growth. It is reasonable to assume that traffic reductions should be equal to the necessary decrease in emissions to achieve areawide air quality compliance, or, to achieve approximately a 35% reduction in future automobile traffic over existing levels.

In establishing trip reduction goals for the City of Cambridge it was decided that the goal for District 1 be to ensure that future development in this district achieve the existing level of transit use near Harvard Station - approximately 50% existing transit use. District 1 would thus be the most restrictive area.

District 3, being the least transit oriented, has the least restrictive trip reduction target. The goal for District 3 was established to be the SIP goal of a 35% reduction in traffic, or a 35% transit use share.



Map 3: Traffic Reduction Target Areas

1 District 1
2 District 2
3 District 3

A goal for District 2 was set at 42.5% or half the difference between the targets in Districts 1 and 3.

This set of goals would yield in the maximum allowable trip generation rates to be allowed for zoned-nonresidential uses in Cambridge listed in Table 2.

Therefore, if these goals are established by the City of Cambridge the future growth in city traffic could be reduced by over 35%. This will assist the city and the region reach goals to reduce automobile emmissions and air pollution.

Table 2
Trip Reduction Goals for Non Residential Development in Cambridge

LAND USE TYPE	ITE LAND USE CODE	ITE PEAK HOUR TRIP GENERATION RATE	DISTRICT 1 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 2 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 3 MAXIMUM PEAK HOUR TRIP RATE
Truck Terminals	030	0.82/000 s. f.	0.41/000 s.f.	0.47/000 s.f.	0.53/000 s.f.
General Light Industry	110	1.18/000 s.f.	0.59/000 s.f.	0.68/000 s.f.	0.79/000 s.f.
General Heavy Industry	120	0.19/000 s.f.	0.10/000 s.f.	0.11/000 s.f.	0.12/000 s.f.
Industrial Park	130	0.99/000 s.f.	0.50/000 s.f.	0.57/000 s.f.	0.64/000 s.f.
Manufacturing	140	0.75/000 s.f.	0.38/000 s.f.	0.43/000 s.f.	0.49/000 s.f.
Warehouse	150	1.63/000 s.f.	0.82/000 s.f.	0.94/000 s.f.	1.06/000 s.f.
Hotel	310	0.73/room	.37/room	0.42/room	0.47/room
Motel	320	0.65/room	.33/room	0.37/room	0.42/room
Day Care Center	511	14.4/000 s.f.	7.2/000 s.f.	8.28/000 s.f.	9.36/000 s.f.
Elementary School	520	0.28/emp.	0.14/emp.	0.16/emp.	0.18/emp.
High School	530	0.83/emp.	0.42/emp.	0.48/emp.	0.54/emp.
Hospital	610	1.17/bed	0.59/bed	0.67/000 s.f.	0.76/000 s.f.
Nursing Home	620	0.21/bed	0.11/bed	0.12/bed	0.14/bed
Clinics	630	1.12/emp.	0.56/emp.	0.64/emp.	0.73/emp.
General Office	710	2.2/1000 s.f.	1.1/000 s.f.	1.27/000 s.f.	1.43/000 s.f.
Medical Office Building	720	3.94/000 s.f.	1.97/000 s.f.	2.27/000 s.f.	2.56/000 s.f.
Civic Center	740	2.85/000 s.f.	1.43/000 s.f.	1.64/000 s.f.	1.85/000 s.f.
Office Parks	750	2.38/000 s.f.	1.19/000 s.f.	1.37/000 s.f.	1.55/000 s.f.
Research Center	760	0.9/000 s.f.	0.45/000 s.f.	0.52/000 s.f.	0.59/000 s.f.
Hi-Tech Office Building	770	1.12/000 s.f.	0.56/000 s.f.	0.64/000 s.f.	0.73/000 s.f.
Townhouse Office Building	780	1.83/000 s.f.	0.92/000 s.f.	1.05/000 s.f.	1.19/000 s.f.
Discount Shopping Center	815	3.79/000 s.f.	1.9/000 s.f.	2.18/000 s.f.	2.46/000 s.f.
Shopping Center < 100,000 s.f.	820	14.42/000 s.f.	7.21/000 s.f.	8.29/000 s.f.	9.73/000 s.f.
Shopping Center 100,000-500,000 s.f.	822	5.9/000 s.f.	2.95/000 s.f.	3.39/000 s.f.	3.84/000 s.f.
Shopping Center 500,000-1,000,000 s.f.	826	3.12/000 s.f.	1.56/000 s.f.	1.79/000 s.f.	2.03/000 s.f.
Shopping Center > 1,000,000 s.f.	827	2.51/000 s.f.	1.26/000 s.f.	1.44/000 s.f.	1.63/000 s.f.
Quality Sit-Down Restaurant	831	6.14/000 s.f.	3.07/000 s.f.	3.53/000 s.f.	3.99/000 s.f.
Fast Food Restaurant	833	31.6/000 s.f.	15.8/000 s.f.	18.2/000 s.f.	20.54/000 s.f.
New Car Sales	841	4.58/000 s.f.	2.29/000 s.f.	2.63/000 s.f.	[illegible]

Table 2 (Contd.)

LAND USE TYPE	ITE LAND USE CODE	ITE PEAK HOUR TRIP GENERATION RATE	DISTRICT 1 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 2 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 3 MAXIMUM PEAK HOUR TRIP RATE
Service Stations	844	3.63/pump	1.82/pump	2.09/pump	2.36/pump
Food Store	850	8.82/000 s.f.	4.41/000 s.f.	5.07/000 s.f.	5.73/000 s.f.
Convenience Market	851	46.7/000 s.f.	23.35/000 s.f.	26.9/000 s.f.	30.4/000 s.f.
Walk-in Bank	911	16.7/000 s.f.	8.35/000 s.f.	9.6/000 s.f.	10.9/000 s.f.
Drive-in Bank	912	25.3/000 s.f.	12.7/000 s.f.	14.5/000 s.f.	16.4/000 s.f.
Walk-in Savings & Loan	913	5.3/000 s.f.	2.65/000 s.f.	3.05/000 s.f.	3.45/000 s.f.
Drive-in Savings & Loan	914	6.8/000 s.f.	3.4/000 s.f.	3.91/000 s.f.	4.42/000 s.f.

VII RECOMMENDED CAMBRIDGE TRIP REDUCTION ORDINANCE

Section I Authority

A. This ordinance shall be known and may be cited as the "Cambridge Trip Reduction Ordinance."

B. The City of Cambridge has authority to adopt this ordinance through its special permit regulations pursuant to Chapter 40A, Section 9, Massachusetts General Law.

Section II Intent and Purpose

A. Planning for future traffic needs in the City of Cambridge to insure the health, safety, welfare and economic well being of the citizens of Cambridge is the mandated responsibility of the community pursuant to Chapter 40A, Massachusetts General Laws.

B. This ordinance is intended to reduce future traffic congestion and air quality impacts caused by development activity that place significant demand on the community's road network.

C. The City of Cambridge adopts a minimum 35% non auto mode share as its goal based upon the Massachusetts 1982 State Implementation Plan for Ozone and Carbon Monoxide.

Section III Applicability

A. Any person who proposes any nonresidential development activity in excess of 50,000 square feet shall be obligated to meet the auto reduction goals of the City of Cambridge as described in Section II C below.

B. The City of Cambridge has been divided into three auto reduction areas based upon zoning districts and proximity to public transportation. The goals for the three districts identified on Map 1 are as follows:

District 1: 50% non-auto mode share;
District 2: 42.5% non-auto mode share;
District 3: 35% non-auto mode share.

C. The maximum peak hour automobile trip rates for each district are as follows:

LAND USE TYPE	ITE LAND USE CODE	ITE PEAK HOUR TRIP GENERATION RATE	DISTRICT 1 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 2 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 3 MAXIMUM PEAK HOUR TRIP RATE
Truck Terminals	030	0.82/000 s. f.	0.41/000 s.f.	0.47/000 s.f.	0.53/000 s.f.
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General Heavy Industry	120	0.19/000 s.f.	0.10/000 s.f.	0.11/000 s.f.	0.12/000 s.f.
Industrial Park	130	0.99/000 s.f.	0.50/000 s.f.	0.57/000 s.f.	0.64/000 s.f.
Manufacturing	140	0.75/000 s.f.	0.38/000 s.f.	0.43/000 s.f.	0.49/000 s.f.
Warehouse	150	1.63/000 s.f.	0.82/000 s.f.	0.94/000 s.f.	1.06/000 s.f.
Hotel	310	0.73/room	0.37/room	0.42/room	0.47/room
Motel	320	0.65/room	0.33/room	0.37/room	0.42/room
Day Care Center	511	14.4/000 s.f.	7.2/000 s.f.	8.28/000 s.f.	9.36/000 s.f.
Elementary School	520	0.28/emp.	0.14/emp.	0.16/emp.	0.18/emp.
High School	530	0.83/emp.	0.42/emp.	0.48/emp.	0.54/emp.
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Office Parks	750	2.38/000 s.f.	1.19/000 s.f.	1.37/000 s.f.	1.55/000 s.f.
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Discount Shopping Center	815	3.79/000 s.f.	1.9/000 s.f.	2.18/000 s.f.	2.46/000 s.f.
Shopping Center < 100,000 s.f.	820	14.42/000 s.f.	7.21/000 s.f.	8.29/000 s.f.	9.73/000 s.f.
Shopping Center 100,000-500,000 s.f.	822	5.9/000 s.f.	2.95/000 s.f.	3.39/000 s.f.	3.84/000 s.f.
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New Car Sales	841	4.58/000 s.f.	2.29/000 s.f.	2.63/000 s.f.	2.98/000 s.f.

LAND USE TYPE	ITE LAND USE CODE	ITE PEAK HOUR TRIP GENERATION RATE	DISTRICT 1 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 2 MAXIMUM PEAK HOUR TRIP RATE	DISTRICT 3 MAXIMUM PEAK HOUR TRIP RATE
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Walk-in Bank	911	16.7/000 s.f.	8.35/000 s.f.	9.6/000 s.f.	10.9/000 s.f.
Drive-in Bank	912	25.3/000 s.f.	12.7/000 s.f.	14.5/000 s.f.	16.4/000 s.f.
Walk-in Savings & Loan	913	5.3/000 s.f.	2.65/000 s.f.	3.05/000 s.f.	3.45/000 s.f.
Drive-in Savings & Loan	914	6.8/000 s.f.	3.4/000 s.f.	3.91/000 s.f.	4.42/000 s.f.

D. Any mixed use developments shall comply with the trip reduction goals for the district in which it is located for the aggregate development.

Section IV Strategies

A. All proposed nonresidential development activity over 50,000 square feet shall submit a transportation access plan that clearly identifies a combination of TSM strategies designed to meet the ordinance goals described in Section III B, C and D. These strategies should include, but not be limited to, the use of incentives for ridesharing, carpool and vanpool preferred parking, transit pass programs and flexible work hours.

B. Every proposed nonresidential development activity over 50,000 square feet shall commit to the naming of a TSM coordinator for the proposed project at the time of project approval. Said TSM coordinator shall be responsible for:

1. Implementing the strategies identified in the transportation access plan to meet the goals described in Section III B, C and D;

2. Reviewing project compliance with the strategies in the access plan and, if necessary modifying these strategies, with the approval of the City of Cambridge Community Development Department, to accomplish these goals;

3. Undertaking annual surveys of employees and visitors at the site to determine the applicability of TSM requirements and to establish employee commute patterns. The TSM coordinator shall provide this annual report to the City of Cambridge Community Development Department in a timely fashion after the start of each calendar year.

Section V Maximum Density

A. The maximum density in each zone shall remain as it was prior to the adoption of this ordinance.

VIII. CONCLUSIONS

As this report has shown, Massachusetts communities have the opportunity to minimize traffic from new development by mandating trip reduction measures through local zoning incentives. By utilizing provisions of Chapter 40A Section 9 of the General Laws a community is authorized to exchange a site density increase for a commitment from the project proponent to meet a specified trip reduction goal.

The example provided in this report for Cambridge has shown how a community may influence non-residential development in an area with high transit availability. Different goals could be established in communities with less direct transit service to encourage vanpool or subscription bus programs. The Waltham 128 Transportation Council is such an attempt, by the private sector, to achieve trip reduction goals through a shuttle van service.

MAPC strongly encourages local officials to use this report as the starting point for discussing local trip reduction goals. If additional information is necessary on trip reduction zoning or on the programs available to communities or local developers contact Daniel Fortier at the MAPC at (617) 451-2770 or CARAVAN for Commuters at (617) 973-7189.

DF/mlm
8/9/88

Transp.
(Manzoning)